2201 Broadway, Suite 101
Oakland, CA 94612-3023
Tel. 510.740.5800
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the IT group

March 6, 2000
Project 791671

LOP 3883

Mr. Paul Supple
ARCO Products Company
PO Box 6549
Moraga, California 94570

Re: Semi-Annual Groundwater Monitoring Report, Fourth Quarter 1999, for ARCO Service Station No. 6113, Located at **785 East Stanley Boulevard, Livermore,** California

Dear Mr. Supple:

Pinnacle Environmental Solutions, a member of The IT Group (Pinnacle), is submitting the attached report which presents the results of the fourth quarter 1999 groundwater monitoring program at ARCO Products Company (ARCO) Service Station No. 6113, located at 785 East Stanley Boulevard, Livermore, California. The monitoring program complies with the Alameda County Health Care Services Agency (ACHCSA) requirements regarding underground tank investigations.

Please call if you have questions.

Sincerely,

Pinnacle

Glen VanderVeen
Project Manager

Dan Easter, R.G. 5722
Project Geologist

Attachment: Semi-Annual Groundwater Monitoring Report, Fourth Quarter 1999

cc: **Susan Hugo, Alameda County Health Care Services Agency**
Danielle Stefani, City of Livermore Fire Department

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Date: March 6, 2000

# ARCO SEMI-ANNUAL GROUNDWATER MONITORING REPORT

Station No.: 6113 Address: 785 East Stanley Boulevard, Livermore, California

Pinnacle Project No. 791671

ARCO Environmental Engineer/Phone No.: Paul Supple/(925) 299-8891

Pinnacle Project Manager/Phone No.: Glen VanderVeen/(510) 740-5807

Primary Agency/Regulatory ID No.: ACHCSA

## WORK PERFORMED THIS QUARTER (FOURTH - 1999):

1. Prepared and submitted status report for third quarter 1999.
2. Performed semi-annual groundwater monitoring and sampling for fourth quarter 1999.

## WORK PROPOSED FOR NEXT QUARTER (FIRST - 2000):

1. Prepare and submit semi-annual groundwater monitoring report for fourth quarter 1999.
2. No environmental work is scheduled at the site during the first quarter 2000.

## MONITORING:

| | |
|---|---|
| Current Phase of Project: | Semi-Annual Groundwater Monitoring |
| Frequency of Sampling: | Annual (4th Quarter): MW-1, MW-2, MW-3, MW-8, MW-9, MW-10<br>Semi-Annual (2nd/4th Quarter): MW-4 through MW-7, MW-11, MW-12 |
| Frequency of Monitoring: | Semi-Annual (groundwater) |
| Is Floating Product (FP) Present On-site: | ☐ Yes ☒ No |
| Bulk Soil Removed to Date : | 288 cubic yards of TPH impacted soil |
| Bulk Soil Removed This Quarter : | None |
| Water Wells or Surface Waters, within 2000 ft., impacted by site: | None |
| Current Remediation Techniques: | None |
| Average Depth to Groundwater | 18.2 feet |
| Groundwater Flow Direction and Gradient (Average) | 0.03 ft/ft toward North |

## ATTACHMENTS:

- Table 1 - Historical Groundwater Elevation and Analytical Data
- Table 2 - Groundwater Flow Direction and Gradient
- Figure 1 - Groundwater Analytical Summary Map
- Figure 2 - Groundwater Elevation Contour Map
- Appendix A - Sampling and Analysis Procedures
- Appendix B - Certified Analytical Reports and Chain-of-Custody Documentation
- Appendix C - Field Data Sheets

# Table 1
## Historical Groundwater Elevation and Analytical Data
## Petroleum Hydrocarbons and Their Constituents
## 1995 - Present*

## ARCO Service Station 6113
## 785 East Stanley Boulevard, Livermore, California

| Well Number | Date Gauged | Top of Casing Elevation (ft-MSL) | Depth to Water (feet) | Groundwater Elevation (ft-MSL) | Date Sampled | TPH Gasoline (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethyl-benzene (µg/L) | Total Xylenes (µg/L) | MTBE (µg/L) | Dissolved Oxygen (mg/L) | Purged/ Not Purged (P/NP) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 | 03-23-95 | 457.04 | 14.12 | 442.92 | 03-23-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 05-31-95 | 457.04 | 14.45 | 442.59 | 05-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 08-31-95 | 457.04 | 17.12 | 439.92 | 08-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 11-28-95 | 457.04 | 16.34 | 440.70 | 11-28-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-1 | 02-22-96 | 457.04 | 13.23 | 443.81 | 02-22-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 05-23-96 | 457.04 | 14.02 | 443.02 | 05-23-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 08-08-96 | 457.04 | 16.13 | 440.91 | 08-08-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 11-07-96 | 457.04 | 17.28 | 439.76 | 11-08-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-1 | 03-27-97 | 457.04 | 14.91 | 442.13 | 03-28-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 05-19-97 | 457.04 | 16.47 | 440.57 | 05-19-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 05-18-98 | 457.04 | 14.69 | 442.35 | 05-18-98 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 11-02-98 | 457.04 | 25.94 | 431.10 | 11-02-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-1 | 06-04-99 | 457.04 | 17.38 | 439.66 | 06-04-99 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-1 | 11-11-99 | 457.04 | 18.63 | 438.41 | 11-11-99 | <50 | <0.5 | <0.5 | <0.5 | <1 | <3 | 1.03 | P |
| MW-2 | 03-23-95 | 457.74 | 14.15 | 443.59 | 03-23-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 05-31-95 | 457.74 | 14.67 | 443.07 | 05-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 08-31-95 | 457.74 | 17.24 | 440.50 | 08-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 11-28-95 | 457.74 | 16.40 | 441.34 | 11-29-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-2 | 02-22-96 | 457.74 | 13.55 | 444.19 | 02-22-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 05-23-96 | 457.74 | 14.29 | 443.45 | 05-23-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 08-08-96 | 457.74 | 16.19 | 441.55 | 08-08-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 11-07-96 | 457.74 | 17.50 | 440.24 | 11-07-96 | 65 | 0.6 | 7.4 | 2.1 | 12 | 5 | | |
| MW-2 | 03-27-97 | 457.74 | 15.32 | 442.42 | 03-28-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 05-19-97 | 457.74 | 16.62 | 441.12 | 05-19-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 05-18-98 | 457.74 | 15.12 | 442.62 | 05-18-98 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 11-02-98 | 457.74 | 26.66 | 431.08 | 11-02-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |

# Table 1
## Historical Groundwater Elevation and Analytical Data
## Petroleum Hydrocarbons and Their Constituents
## 1995 - Present*

## ARCO Service Station 6113
## 785 East Stanley Boulevard, Livermore, California

| Well Number | Date Gauged | Top of Casing Elevation (ft-MSL) | Depth to Water (feet) | Groundwater Elevation (ft-MSL) | Date Sampled | TPH Gasoline (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethyl-benzene (µg/L) | Total Xylenes (µg/L) | MTBE (µg/L) | Dissolved Oxygen (mg/L) | Purged/ Not Purged (P/NP) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-2 | 06-04-99 | 457.74 | 17.74 | 440.00 | 06-04-99 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-2 | 11-11-99 | 457.74 | 18.75 | 438.99 | 11-11-99 | <50 | <0.5 | <0.5 | <0.5 | <1 | <3 | 0.82 | P |
| MW-3 | 03-23-95 | 456.97 | 14.13 | 442.84 | 03-23-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 05-31-95 | 456.97 | 14.46 | 442.51 | 05-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 08-31-95 | 456.97 | 17.06 | 439.91 | 08-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 11-28-95 | 456.97 | 16.27 | 440.70 | 11-28-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-3 | 02-22-96 | 456.97 | 13.14 | 443.83 | 02-22-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 05-23-96 | 456.97 | 13.95 | 443.02 | 05-23-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 08-08-96 | 456.97 | 16.03 | 440.94 | 08-08-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 11-07-96 | 456.97 | 17.26 | 439.71 | 11-07-96 | <50 | <0.5 | 0.9 | <0.5 | 1.5 | <3 | | |
| MW-3 | 03-27-97 | 456.97 | 14.85 | 442.12 | 03-28-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 05-19-97 | 456.97 | 16.40 | 440.57 | 05-19-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 05-18-98 | 456.97 | 14.66 | 442.31 | 05-18-98 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 11-02-98 | 456.97 | 25.85 | 431.12 | 11-02-98 | <1,000 | <10 | <10 | <10 | <10 | 1,700 | | |
| MW-3 | 06-04-99 | 456.97 | 17.35 | 439.62 | 06-04-99 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-3 | 11-11-99 | 456.97 | 18.58 | 438.39 | 11-11-99 | <50 | <0.5 | <0.5 | <0.5 | <1 | <3 | 0.79 | P |
| MW-4 | 03-23-95 | 456.55 | 15.39 | 441.16 | 03-23-95 | 210 | 2.1 | 0.6 | 0.8 | 2.1 | -- | | |
| MW-4 | 05-31-95 | 456.55 | 15.32 | 441.23 | 05-31-95 | 190 | 1.6 | <0.5 | 0.7 | 0.9 | -- | | |
| MW-4 | 08-31-95 | 456.55 | 17.86 | 438.69 | 08-31-95 | 160 | 1.2 | 0.7 | <0.5 | <2 | <3 | | |
| MW-4 | 11-28-95 | 456.55 | 17.18 | 439.37 | 11-29-95 | 150 | 0.7 | <0.5 | 0.7 | 1.4 | <3 | | |
| MW-4 | 02-22-96 | 456.55 | 14.80 | 441.75 | 02-22-96 | 100 | <0.5 | <0.5 | <0.6 | 0.8 | <3 | | |
| MW-4 | 05-23-96 | 456.55 | 14.43 | 442.12 | 05-23-96 | 86 | <0.5 | <0.5 | <0.5 | <0.7 | <3 | | |
| MW-4 | 08-08-96 | 456.55 | 16.80 | 439.75 | 08-08-96 | 98 | <0.5 | <0.5 | <0.5 | 1.3 | <3 | | |
| MW-4 | 11-07-96 | 456.55 | 17.90 | 438.65 | 11-13-96 | 140 | <0.5 | <0.5 | <0.9 | 1.3 | <3 | | |
| MW-4 | 03-27-97 | 456.55 | 15.22 | 441.33 | 03-28-97 | <50 | 1.1 | <0.5 | <0.5 | 1.6 | <3 | | |

# Table 1
## Historical Groundwater Elevation and Analytical Data
## Petroleum Hydrocarbons and Their Constituents
## 1995 - Present*

## ARCO Service Station 6113
## 785 East Stanley Boulevard, Livermore, California

| Well Number | Date Gauged | Top of Casing Elevation (ft-MSL) | Depth to Water (feet) | Groundwater Elevation (ft-MSL) | Date Sampled | TPH Gasoline (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethyl-benzene (µg/L) | Total Xylenes (µg/L) | MTBE (µg/L) | Dissolved Oxygen (mg/L) | Purged/ Not Purged (P/NP) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-4 | 05-19-97 | 456.55 | 16.98 | 439.57 | 05-19-97 | 62 | <0.5 | <0.5 | <0.5 | 0.6 | <3 | | |
| MW-4 | 05-18-98 | 456.55 | 14.99 | 441.56 | 05-18-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | 64 | | |
| MW-4 | 11-02-98 | 456.55 | 25.29 | 431.26 | 11-02-98 | 74 | <0.5 | <0.5 | <0.5 | <0.5 | 96 | | |
| MW-4 | 06-04-99 | 456.55 | 17.95 | 438.60 | 06-04-99 | 100 | <0.5 | <0.5 | <0.5 | <0.5 | 38 | NM | P |
| MW-4 | 11-11-99 | 456.55 | 19.25 | 437.30 | 11-11-99 | 88 | <0.5 | <0.5 | <0.5 | <1 | 10 | 0.77 | P |
| MW-5 | 03-23-95 | 455.84 | 13.97 | 441.87 | 03-23-95 | 68 | 4.2 | 3.4 | 2.3 | 12 | -- | | |
| MW-5 | 05-31-95 | 455.84 | Not surveyed | | 05-31-95 | Not sampled: well was inaccessible | | | | | | | |
| MW-5 | 08-31-95 | 455.84 | Not surveyed | | 08-31-95 | Not sampled: well was inaccessible | | | | | | | |
| MW-5 | 11-28-95 | 455.84 | 16.46 | 439.38 | 11-29-95 | 960 | 41 | 24 | 38 | 210 | <5 | | |
| MW-5 | 02-22-96 | 455.84 | 13.34 | 442.50 | 02-22-96 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-5 | 05-23-96 | 455.84 | 14.36 | 441.48 | 05-23-96 | 7,100 | 440 | 180 | 270 | 1,700 | <50 | | |
| MW-5 | 08-08-96 | 455.84 | 16.38 | 439.46 | 08-08-96 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-5 | 11-07-96 | 455.84 | 17.26 | 438.58 | 11-13-96 | 5,600 | 230 | 86 | 210 | 1,100 | <80 | | |
| MW-5 | 03-27-97 | 455.84 | 15.95 | 439.89 | 03-28-97 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-5 | 05-19-97 | 455.84 | 16.64 | 439.20 | 05-20-97 | 7,600 | 480 | 140 | 400 | 1,200 | <40 | | |
| MW-5 | 05-18-98 | 455.84 | 14.75 | 441.09 | 05-18-98 | 990 | 46 | 13 | 45 | 180 | 4 | | |
| MW-5 | 11-02-98 | 455.84 | 27.83 | 428.01 | 11-02-98 | 14,000 | 690 | 140 | 550 | 2,200 | 100 | | |
| MW-5 | 06-04-99 | 455.84 | 17.47 | 438.37 | 06-04-99 | 8,300 | 690 | 370 | 90 | 440 | 1,400 | NM | P |
| MW-5 | 11-11-99 | 455.84 | 18.80 | 437.04 | 11-11-99 | 18,000 | 900 | 190 | 1,100 | 3,200 | 72 | 0.86 | P |
| MW-6 | 03-23-95 | 454.93 | 13.38 | 441.55 | 03-23-95 | <50 | 1.5 | <0.5 | <0.5 | 0.9 | -- | | |
| MW-6 | 05-31-95 | 454.93 | 13.96 | 440.97 | 05-31-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | | |
| MW-6 | 08-31-95 | 454.93 | 16.71 | 438.22 | 08-31-95 | 150 | 9 | 1.8 | 4 | 12 | <3 | | |
| MW-6 | 11-28-95 | 454.93 | 15.65 | 439.28 | 11-29-95 | <50 | 0.6 | <0.5 | <0.5 | 0.8 | <3 | | |
| MW-6 | 02-22-96 | 454.93 | 12.53 | 442.40 | 02-22-96 | <50 | 1.9 | <0.5 | 0.8 | 2.1 | <3 | | |
| MW-6 | 05-23-96 | 454.93 | 13.24 | 441.69 | 05-23-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |



Pinnacle

# Table 1
## Historical Groundwater Elevation and Analytical Data
## Petroleum Hydrocarbons and Their Constituents
## 1995 - Present*

## ARCO Service Station 6113
## 785 East Stanley Boulevard, Livermore, California

| Well Number | Date Gauged | Top of Casing Elevation (ft-MSL) | Depth to Water (feet) | Groundwater Elevation (ft-MSL) | Date Sampled | TPH Gasoline (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethyl-benzene (µg/L) | Total Xylenes (µg/L) | MTBE (µg/L) | Dissolved Oxygen (mg/L) | Purged/ Not Purged (P/NP) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-6 | 08-08-96 | 454.93 | 16.65 | 438.28 | 08-08-96 | <50 | 0.5 | <0.5 | <0.5 | 0.5 | <3 | | |
| MW-6 | 11-07-96 | 454.93 | 16.65 | 438.28 | 11-08-96 | 110 | 5.3 | 1.3 | 3.1 | 6.6 | <3 | | |
| MW-6 | 03-27-97 | 454.93 | 14.25 | 440.68 | 03-28-97 | <50 | 2.3 | <0.5 | 0.9 | 3.5 | 4 | | |
| MW-6 | 05-19-97 | 454.93 | 15.87 | 439.06 | 05-20-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-6 | 05-18-98 | 454.93 | 14.00 | 440.93 | 05-18-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-6 | 11-02-98 | 454.93 | 24.95 | 429.98 | 11-02-98 | <50 | 1.2 | <0.5 | <0.5 | <0.5 | 3 | | |
| MW-6 | 06-04-99 | 454.93 | 16.68 | 438.25 | 06-04-99 | 310 | 41 | 3.8 | 11 | 19 | 33 | NM | P |
| MW-6 | 11-11-99 | 454.93 | 16.12 | 438.81 | 11-11-99 | <50 | 0.5 | <0.5 | <0.5 | <1 | <3 | 0.92 | P |
| MW-7 | 03-23-95 | 454.92 | 13.29 | 441.63 | 03-23-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | | |
| MW-7 | 05-31-95 | 454.92 | 13.72 | 441.20 | 05-31-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | -- | | |
| MW-7 | 08-31-95 | 454.92 | 16.53 | 438.39 | 08-31-95 | <50 | <0.5 | <0.5 | <0.5 | 1.2 | <3 | | |
| MW-7 | 11-28-95 | 454.92 | 15.50 | 439.42 | 11-29-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-7 | 02-22-96 | 454.92 | 12.30 | 442.62 | 02-22-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-7 | 05-23-96 | 454.92 | 13.02 | 441.90 | 05-23-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-7 | 08-08-96 | 454.92 | Not surveyed | | 08-08-96 | Not sampled: unable to locate well | | | | | | | |
| MW-7 | 11-07-96 | 454.92 | 16.50 | 438.42 | 11-08-96 | <50 | <0.5 | <0.5 | <0.5 | 0.8 | <3 | | |
| MW-7 | 03-27-97 | 454.92 | 14.22 | 440.70 | 03-28-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-7 | 05-19-97 | 454.92 | 15.74 | 439.18 | 05-20-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-7 | 05-18-98 | 454.92 | 13.82 | 441.10 | 05-18-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-7 | 11-02-98 | 454.92 | 24.80 | 430.12 | 11-02-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | 4 | | |
| MW-7 | 06-04-99 | 454.92 | 16.55 | 438.37 | 06-04-99 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | NM | P |
| MW-7 | 11-11-99 | 454.92 | 18.02 | 436.90 | 11-11-99 | <50 | <0.5 | <0.5 | <0.5 | <1 | <3 | 1.03 | P |
| MW-8 | 03-23-95 | 456.97 | 11.55 | 445.42 | 03-23-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 05-31-95 | 456.97 | 12.37 | 444.60 | 05-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 08-31-95 | 456.97 | 15.68 | 441.29 | 08-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |

# Table 1
## Historical Groundwater Elevation and Analytical Data
## Petroleum Hydrocarbons and Their Constituents
## 1995 - Present*

## ARCO Service Station 6113
## 785 East Stanley Boulevard, Livermore, California

| Well Number | Date Gauged | Top of Casing Elevation (ft-MSL) | Depth to Water (feet) | Groundwater Elevation (ft-MSL) | Date Sampled | TPH Gasoline (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethyl-benzene (µg/L) | Total Xylenes (µg/L) | MTBE (µg/L) | Dissolved Oxygen (mg/L) | Purged/ Not Purged (P/NP) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-8 | 11-28-95 | 456.97 | 14.15 | 442.82 | 11-28-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-8 | 02-22-96 | 456.97 | 10.97 | 446.00 | 02-22-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 05-23-96 | 456.97 | 11.90 | 445.07 | 05-23-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 08-08-96 | 456.97 | 13.85 | 443.12 | 08-08-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 11-07-96 | 456.97 | 15.08 | 441.89 | 11-08-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-8 | 03-27-97 | 456.97 | 12.96 | 444.01 | 03-28-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 05-19-97 | 456.97 | 14.35 | 442.62 | 05-19-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 05-18-98 | 456.97 | 12.97 | 444.00 | 05-18-98 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 11-02-98 | 456.97 | 26.01 | 430.96 | 11-02-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-8 | 06-04-99 | 456.97 | 15.53 | 441.44 | 06-04-99 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-8 | 11-11-99 | 456.97 | 16.67 | 440.30 | 11-11-99 | <50 | <0.5 | <0.5 | <0.5 | <1 | <3 | 1.01 | P |
| MW-9 | 03-23-95 | 456.18 | 13.18 | 443.00 | 03-23-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 05-31-95 | 456.18 | 12.66 | 443.52 | 05-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 08-31-95 | 456.18 | 14.40 | 441.78 | 08-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 11-28-95 | 456.18 | 14.26 | 441.92 | 11-29-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-9 | 02-22-96 | 456.18 | 12.05 | 444.13 | 02-22-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 05-23-96 | 456.18 | 12.07 | 444.11 | 05-23-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 08-08-96 | 456.18 | 14.12 | 442.06 | 08-08-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 11-07-96 | 456.18 | 15.42 | 440.76 | 11-08-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-9 | 03-27-97 | 456.18 | 13.01 | 443.17 | 03-28-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 05-19-97 | 456.18 | 14.60 | 441.58 | 05-19-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 05-18-98 | 456.18 | 12.60 | 443.58 | 05-18-98 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-9 | 11-02-98 | 456.18 | 25.08 | 431.10 | 11-02-98 | Not sampled | | | | | | | |
| MW-9 | 06-04-99 | 456.18 | 15.87 | 440.31 | 06-04-99 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | NM | P |
| MW-9 | 11-11-99 | 456.18 | 17.02 | 439.16 | 11-11-99 | <50 | <0.5 | <0.5 | <0.5 | <1 | <3 | 0.96 | P |

# Table 1
## Historical Groundwater Elevation and Analytical Data
## Petroleum Hydrocarbons and Their Constituents
## 1995 - Present*

## ARCO Service Station 6113
## 785 East Stanley Boulevard, Livermore, California

| Well Number | Date Gauged | Top of Casing Elevation (ft-MSL) | Depth to Water (feet) | Groundwater Elevation (ft-MSL) | Date Sampled | TPH Gasoline (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethyl-benzene (µg/L) | Total Xylenes (µg/L) | MTBE (µg/L) | Dissolved Oxygen (mg/L) | Purged/ Not Purged (P/NP) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-10 | 03-23-95 | 456.85 | 14.86 | 441.99 | 03-23-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 05-31-95 | 456.85 | 15.63 | 441.22 | 05-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 08-31-95 | 456.85 | 14.40 | 442.45 | 08-31-95 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 11-28-95 | 456.85 | 17.24 | 439.61 | 11-29-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-10 | 02-22-96 | 456.85 | 14.30 | 442.55 | 02-22-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 05-23-96 | 456.85 | 14.93 | 441.92 | 05-23-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 08-08-96 | 456.85 | 17.20 | 439.65 | 08-08-96 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 11-07-96 | 456.85 | 18.25 | 438.60 | 11-08-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-10 | 03-27-97 | 456.85 | 15.77 | 441.08 | 03-28-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 05-19-97 | 456.85 | 17.38 | 439.47 | 05-19-97 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 05-18-98 | 456.85 | 15.47 | 441.38 | 05-18-98 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 11-02-98 | 456.85 | 26.94 | 429.91 | 11-02-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-10 | 06-04-99 | 456.85 | 17.19 | 439.66 | 06-04-99 | Not sampled: well sampled annually, during the fourth quarter | | | | | | | |
| MW-10 | 11-11-99 | 456.85 | 19.35 | 437.50 | 11-11-99 | <50 | <0.5 | <0.5 | <0.5 | <1 | <3 | 0.68 | P |
| MW-11 | 03-23-95 | 455.07 | 17.34 | 437.73 | 03-23-95 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-11 | 05-31-95 | 455.07 | 16.68 | 438.39 | 05-31-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | - - | | |
| MW-11 | 08-31-95 | 455.07 | 20.20 | 434.87 | 08-31-95 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-11 | 11-28-95 | 455.07 | 17.80 | 437.27 | 11-28-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-11 | 02-22-96 | 455.07 | 15.97 | 439.10 | 02-22-96 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-11 | 05-23-96 | 455.07 | 15.50 | 439.57 | 05-23-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-11 | 08-08-96 | 455.07 | 17.77 | 437.30 | 08-08-96 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-11 | 11-07-96 | 455.07 | 17.45 | 437.62 | 11-13-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-11 | 03-27-97 | 455.07 | 15.77 | 439.30 | 03-28-97 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-11 | 05-19-97 | 455.07 | 16.80 | 438.27 | 05-19-97 | <50 | 1.1 | 4.5 | <0.5 | 2.2 | <3 | | |
| MW-11 | 05-18-98 | 455.07 | 15.38 | 439.69 | 05-18-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-11 | 11-02-98 | 455.07 | 24.15 | 430.92 | 11-02-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |

# Table 1
## Historical Groundwater Elevation and Analytical Data
## Petroleum Hydrocarbons and Their Constituents
## 1995 - Present*

## ARCO Service Station 6113
## 785 East Stanley Boulevard, Livermore, California

| Well Number | Date Gauged | Top of Casing Elevation (ft-MSL) | Depth to Water (feet) | Groundwater Elevation (ft-MSL) | Date Sampled | TPH Gasoline (µg/L) | Benzene (µg/L) | Toluene (µg/L) | Ethyl-benzene (µg/L) | Total Xylenes (µg/L) | MTBE (µg/L) | Dissolved Oxygen (mg/L) | Purged/ Not Purged (P/NP) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-11 | 06-04-99 | 455.07 | 18.39 | 436.68 | 06-04-99 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | NM | P |
| MW-11 | 11-11-99 | 455.07 | 18.62 | 436.45 | 11-11-99 | <50 | <0.5 | <0.5 | <0.5 | <1 | <3 | 1.01 | P |
| MW-12 | 03-23-95 | 455.04 | 15.54 | 439.50 | 03-23-95 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-12 | 05-31-95 | 455.04 | 15.66 | 439.38 | 05-31-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | - - | | |
| MW-12 | 08-31-95 | 455.04 | 18.23 | 436.81 | 08-31-95 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-12 | 11-28-95 | 455.04 | 17.53 | 437.51 | 11-28-95 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-12 | 02-22-96 | 455.04 | 14.45 | 440.59 | 02-22-96 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-12 | 05-23-96 | 455.04 | 14.88 | 440.16 | 05-23-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-12 | 08-08-96 | 455.04 | 17.30 | 437.74 | 08-08-96 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-12 | 11-07-96 | 455.04 | 18.30 | 436.74 | 11-13-96 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-12 | 03-27-97 | 455.04 | 15.69 | 439.35 | 03-28-97 | Not sampled: well sampled semi-annually, during the second and fourth quarters | | | | | | | |
| MW-12 | 05-19-97 | 455.04 | 17.41 | 437.63 | 05-19-97 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-12 | 05-18-98 | 455.04 | 15.21 | 439.83 | 05-18-98 | <50 | <0.5 | <0.5 | <0.5 | <0.5 | <3 | | |
| MW-12 | 11-02-98 | 455.04 | Not surveyed | | 11-02-98 | Not sampled: unable to locate well | | | | | | | |
| MW-12 | 06-04-99 | 455.04 | Not surveyed | | 06-04-99 | Not sampled: unable to locate well | | | | | | | |
| MW-12 | 11-11-99 | 455.04 | Not surveyed | | 11-11-99 | Not sampled: unable to locate well | | | | | | | |

TPH: Total petroleum hydrocarbons by modified EPA method 8015
BTEX: Benzene, toluene, ethylbenzene, total xylenes by EPA method 8021B. (EPA method 8020 prior to 11/11/99)
MTBE: Methyl tert-butyl ether by EPA method 8021B. (EPA method 8020 prior to 11/11/99).
ft-MSL: elevation in feet, relative to mean sea level
µg/L: micrograms per liter
mg/L: milligrams per liter
<: less than laboratory detection limit stated to the right
*: For previous historical groundwater elevation and analytical data please refer to *Fourth Quarter 1995 Groundwater Monitoring Program Results, ARCO Service Station 6113, Livermore, California,* (EMCON, February 26, 1996).

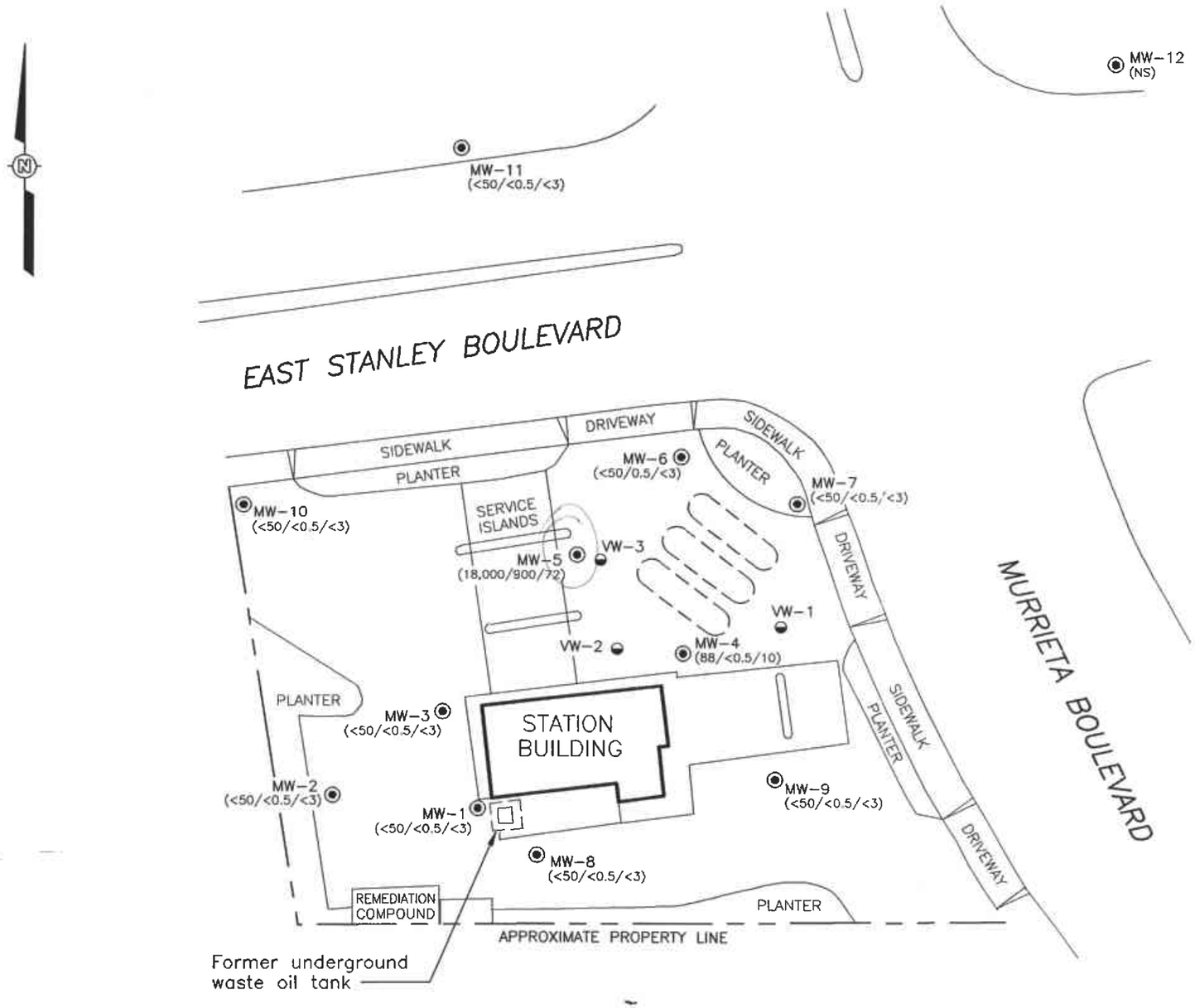
## Table 2
## Groundwater Flow Direction and Gradient

## ARCO Service Station 6113
## 785 East Stanley Boulevard, Livermore, California

| Date Measured | Average Flow Direction | Average Hydraulic Gradient |
|---|---|---|
| 03-23-95 | Northwest | 0.035 |
| 05-31-95 | North-Northwest | 0.028 |
| 08-31-95 | North-Northwest | 0.03 |
| 11-28-95 | North-Northwest | 0.025 |
| 02-22-96 | North-Northwest | 0.031 |
| 05-23-96 | North-Northwest | 0.025 |
| 08-08-96 | North | 0.019 |
| 11-07-96 | North-Northeast | 0.019 |
| 03-27-97 | North-Northwest | 0.021 |
| 05-19-97 | North | 0.019 |
| 05-18-98 | North | 0.02 |
| 11-02-98 | North | 0.02 |
| 06-04-99 | North | 0.02 |
| **11-11-99** | **North** | **0.03** |

DRAWN BY K Block 1-31-00

PROJECT NUMBER 791671




EXPLANATION

| | |
|---|---|
| ◉ | Groundwater monitoring well |
| ◒ | Vapor extraction well |
| ⊂⊃ | Existing underground gasoline storage tank |
| (18,000/900/72) | Concentration of total petroleum hydrocarbons as gasoline (TPHG), benzene, and MTBE in groundwater (ug/L); samples collected 11/11/99 |
| < | Not detected at or above the indicated laboratory detection limit |
| NS | Not sampled |

APPROXIMATE SCALE

0 40 80 FEET

*Base map modified from RESNA, 1994.*

IT CORPORATION

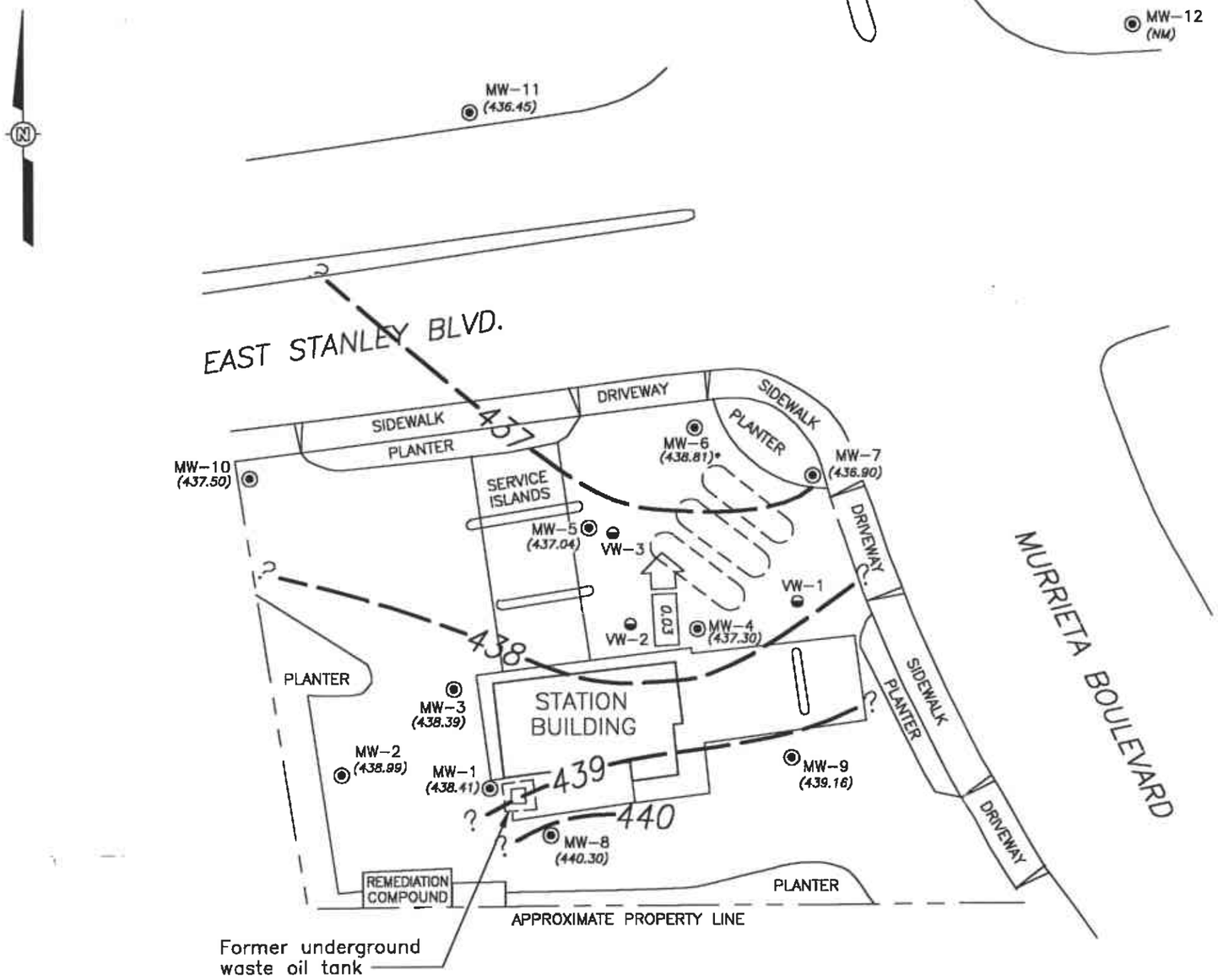
ARCO PRODUCTS COMPANY
SERVICE STATION 6113

FIGURE 1
**GROUNDWATER ANALYTICAL SUMMARY**
**FOURTH QUARTER 1999**
785 EAST STANLEY BOULEVARD
LIVERMORE, CALIFORNIA

SANJOSE/CADD: N:\cad\DWG\PINACL\6113\6113chem.dwg Mon, 31/Jan/00 12:24pm kblack

PROJECT NUMBER 791671

DRAWN BY K Block 1-31-00




EXPLANATION

- Groundwater monitoring well
- Vapor extraction well
- Existing underground gasoline storage tank
- (436.90) Groundwater elevation (Ft.–MSL) measured 11/11/99
- Groundwater elevation contour (Ft.–MSL)
- Approximate direction of groundwater flow showing gradient
- NM Not measured
- * Not used to construct contours

APPROXIMATE SCALE

0 40 80 FEET

*Base map modified from RESNA, 1994.*

IT CORPORATION

ARCO PRODUCTS COMPANY
SERVICE STATION 6113

FIGURE 2
GROUNDWATER ELEVATION CONTOURS
FOURTH QUARTER 1999
785 EAST STANLEY BOULEVARD
LIVERMORE, CALIFORNIA

SANJOSE/CADD: N:\cad\DWG\PINACL\6113\6113awc.dwg Mon. 31/Jan/00 12:36pm kblack

# APPENDIX A

# SAMPLING AND ANALYSIS PROCEDURES

# APPENDIX A

# SAMPLING AND ANALYSIS PROCEDURES

The sampling and analysis procedures for water quality monitoring programs are contained in this appendix. The procedures provided for consistent and reproducible sampling methods, proper application of analytical methods, and accurate and precise analytical results. Finally, these procedures provided guidelines so that the overall objectives of the monitoring program were achieved.

The following documents have been used as guidelines for developing these procedures:

- Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities, Environmental Protection Agency (EPA)-530/SW-611, August 1977
- Resource Conservation and Recovery Act (RCRA) Groundwater Monitoring Technical Enforcement Guidance Document, Office of Solid Waste and Emergency Response (OSWER) 9950.1, September 1986
- Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA SW-846, 3rd edition, November 1986
- Methods for Organic Chemical Analysis of Municipal and Industrial Waste Water, EPA-600/4-82-057, July 1982
- Methods for Organic Chemical Analysis of Water and Wastes, EPA-600/4-79-020, revised March 1983
- Leaking Underground Fuel Tank (LUFT) Field Manual, California State Water Resources Control Board, revised October 1989

## Sample Collection

Sample collection procedures include equipment cleaning, water level and total well depth measurements, and well purging and sampling.

## Equipment Cleaning

Before the sampling event was started, equipment that was used to sample groundwater was disassembled and cleaned with detergent water and then rinsed with deionized water. During field sampling, equipment surfaces that were placed in the well or came into contact with groundwater during field sampling were steam cleaned with deionized water before the next well was purged or sampled.

## Water Level, Floating Hydrocarbon, and Total Well Depth Measurements

Before purging and sampling occurred, the depth to water, floating hydrocarbon thickness and total well depth were measured using an oil/water interface measuring system. The oil/water interface measuring system consists of a probe that emits a continuous audible tone when immersed in a nonconductive fluid, such as oil or gasoline and an intermittent tone when immersed in a conductive fluid, such as water. The floating hydrocarbon thickness and water level were measured by lowering the probe into the well. Liquid levels were recorded relative to the tone emitted at the groundwater surface. The sonic probe was decontaminated by being rinsed with deionized water or steam cleaned after each use. A bottom-filling, clear Teflon® bailer was used to verify floating hydrocarbon thickness measurements of less than 0.02 foot. Alternatively, an electric sounder and a bottom-filling Teflon bailer may have been used to record floating hydrocarbon thickness and depth to water.

The electric sounder is a transistorized instrument that uses a reel-mounted, two-conductor, coaxial cable that connects the control panel to the sensor. Cable markings are stamped at 1-foot intervals. The water level was measured by lowering the sensor into the monitoring well. A low-current circuit was completed when the sensor contacted the water, which served as an electrolyte. The current was amplified and fed into an indicator light and audible buzzer, signaling when water had been contacted. A sensitivity control compensated for highly saline or conductive water. The electric sounder was decontaminated by being rinsed with deionized water after each use. The bailer was lowered to a point just below the liquid level, retrieved, and observed for floating hydrocarbon.

Liquid measurements were recorded to the nearest 0.01 foot on the depth to water/floating product survey form. The groundwater elevation at each monitoring well was calculated by subtracting the measured depth to water from the surveyed elevation of the top of the well casing. (Every attempt was made to measure depth to water for all wells on the same day.) Total well depth was then measured by lowering the sensor to the bottom of the well. Total well depth, used to calculate purge volumes and to determine whether the well screen was partially obstructed by silt, was recorded to the nearest 0.1 foot on the depth to water/floating product survey form.

## Well Purging

If the depth to groundwater was above the top of screens of the monitoring wells, then the wells were purged. Before sampling occurred, a polyvinyl chloride (PVC) bailer, centrifugal pump, low-flow submersible pump, or Teflon bailer was used to purge standing water in the casing and gravel pack from the monitoring well. Monitoring wells were purged according to the protocol presented in Figure A-1. In most monitoring wells, the amount of water purged before sampling was greater than or equal to three casing volumes. Some monitoring wells were expected to be evacuated to dryness after removing fewer than three casing volumes. These low-yield monitoring wells were allowed to recharge for up to 24 hours. Samples were obtained as soon as the monitoring wells recharged to a level sufficient for sample collection. If insufficient water recharged after 24 hours, the monitoring well was recorded as dry for the sampling event.

Groundwater purged from the monitoring wells was transported in a 500-gallon water trailer, 55-gallon drum, or a 325-gallon truck-mounted tank to IT's San Jose or Sacramento office location for temporary storage. IT arranged for transport and disposal of the purged groundwater through Integrated Waste Stream Management, Inc.

Field measurements of pH, specific conductance, and temperature were recorded in a waterproof field logbook. Figure A-2 shows an example of the water sample field data sheet on which field data are recorded. Field data sheets were reviewed for completeness by the sampling coordinator after the sampling event was completed.

The pH, specific conductance, and temperature meter were calibrated each day before field activities were begun. The calibration was checked once each day to verify meter performance. Field meter calibrations were recorded on the water sample field data sheet.

## Well Sampling

A Teflon bailer was the only equipment acceptable for well sampling. When samples for volatile organic analysis were being collected, the flow of groundwater from the bailer was regulated to minimize turbulence and aeration. Glass bottles of at least 40-milliliters volume and fitted with Teflon-lined septa were used in sampling for volatile organics. These bottles were filled completely to prevent air from remaining in the bottle. A positive meniscus formed when the bottle was completely full. A convex Teflon septum was placed over the positive meniscus to eliminate air. After the bottle was capped, it was inverted and tapped to verify that it contained no air bubbles. The sample containers for other parameters were filled, filtered as required, and capped.

When required, dissolved concentrations of metals were determined using appropriate field filtration techniques. The sample was filtered by emptying the contents of the Teflon bailer into a pressure transfer vessel. A disposable 0.45-micron acrylic copolymer filter was threaded onto the transfer vessel at the discharge point, and the vessel was sealed. Pressure was applied to the vessel with a hand pump and the filtrate directed into the appropriate containers. Each filter was used once and discarded.

## Sample Preservation and Handling

The following section specifies sample containers, preservation methods, and sample handling procedures.

### Sample Containers and Preservation

Sample containers vary with each type of analytical parameter. Container types and materials were selected to be nonreactive with the particular analytical parameter tested.

### Sample Handling

Sample containers were labeled immediately prior to sample collection. Samples were kept cool with cold packs until received by the laboratory. At the time of sampling, each sample was logged on an ARCO chain-of-custody record that accompanied the sample to the laboratory.

Samples that required overnight storage prior to shipping to the laboratory were kept cool (4° C) in a refrigerator. The refrigerator was kept in a warehouse, which was locked when not occupied by an IT employee. A sample/refrigerator log was kept to record the date and time that samples were placed into and removed from the refrigerator.

Samples were transferred from IT to an ARCO-approved laboratory by courier or taken directly to the laboratory by the environmental sampler. Sample shipments from IT to laboratories performing the selected analyses routinely occurred within 24 hours of sample collection.

## Sample Documentation

The following procedures were used during sampling and analysis to provide chain-of-custody control during sample handling from collection through storage. Sample documentation included the use of the following:

- Water sample field data sheets to document sampling activities in the field
- Labels to identify individual samples
- Chain-of-custody record sheets for documenting possession and transfer of samples
- Laboratory analysis request sheets for documenting analyses to be performed

## Field Logbook

In the field, the sampler recorded the following information on the water sample field data sheet (see Figure A-2) for each sample collected:

- Project number
- Client's name
- Location
- Name of sampler
- Date and time
- Well accessibility and integrity
- Pertinent well data (e.g., casing diameter, depth to water, well depth)
- Calculated and actual purge volumes
- Purging equipment used
- Sampling equipment used
- Appearance of each sample (e.g., color, turbidity, sediment)
- Results of field analyses (temperature, pH, specific conductance)
- General comments

The water sample field data sheet was signed by the sampler and reviewed by the sampling coordinator.

## Labels

Sample labels contained the following information:

- Project number
- Sample number (i.e., well designation)
- Sample depth
- Sampler's initials
- Date and time of collection
- Type of preservation used (if any)

## Sampling and Analysis Chain-of-Custody Record

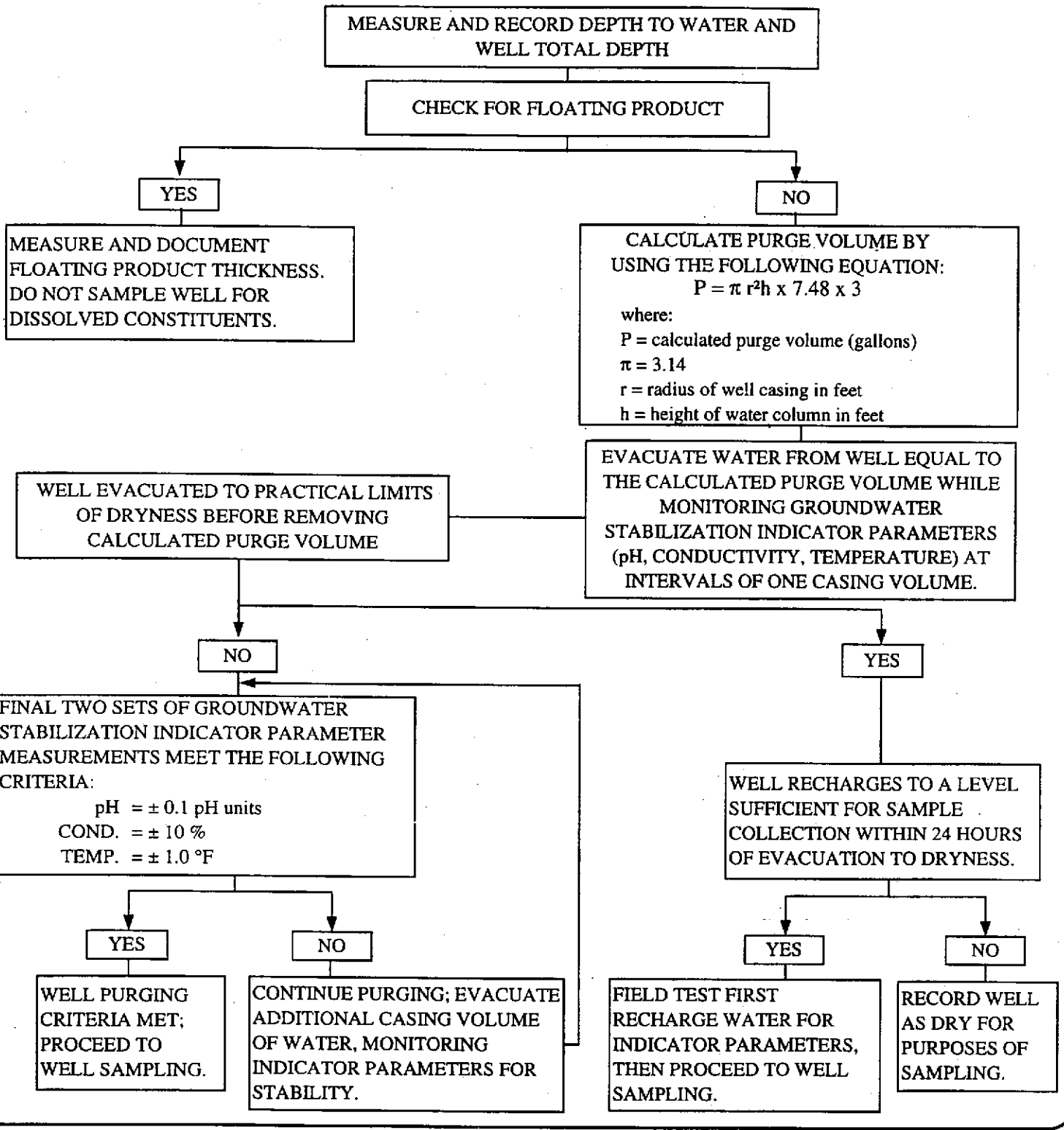
The ARCO chain-of-custody record initiated at the time of sampling contained, at a minimum, the sample designation (including the depth at which the sample was collected), sample type, analytical request, date of sampling, and the name of the sampler. The record sheet was signed, timed, and dated by the sampler when transferring the samples. The number of custodians in the chain of possession was minimized. A copy of the ARCO chain-of-custody record was returned to IT with the analytical results.

## Groundwater Sampling and Analysis Request Form

A groundwater sampling and analysis request form (see Figure A-3) was used to communicate to the environmental sampler the requirements of the monitoring event. At a minimum, the groundwater sampling and analysis request form included the following information:

- Date scheduled
- Site-specific instructions
- Specific analytical parameters
- Well number
- Well specifications (expected total depth, depth of water, and product thickness)

# MONITORING WELL PURGING PROTOCOL




MONITORING WELL PURGING PROTOCOL

FIGURE
A-1

# WATER SAMPLE FIELD DATA SHEET

PROJECT NO : _____ SAMPLE ID : _____

PURGED BY : _____ CLIENT NAME : _____

SAMPLED BY : _____ LOCATION : _____

TYPE: Groundwater _____ Surface Water _____ Leachate _____ Other _____

CASING DIAMETER (inches): 2 _____ 3 _____ 4 _____ 4.5 _____ 6 _____ Other _____

CASING ELEVATION (feet/MSL) : _____ VOLUME IN CASING (gal.) : _____

DEPTH OF WELL (feet) : _____ CALCULATED PURGE (gal.) : _____

DEPTH OF WATER (feet) : _____ ACTUAL PURGE VOL. (gal.) : _____

DATE PURGED : _____ END PURGE : _____

DATE SAMPLED : _____ SAMPLING TIME : _____

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | TURBIDITY (visual/NTU) | TIME (2400 HR) |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

OTHER: _____ ODOR: _____ _____ (COBALT 0-100) _____ (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : _____

PURGING EQUIPMENT

_____ 2" Bladder Pump _____ Bailer (Teflon)

_____ Centrifugal Pump _____ Bailer (PVC)

_____ Submersible Pump _____ Bailer (Stainless Steel)

_____ Well Wizard™ _____ Dedicated

Other: _____

SAMPLING EQUIPMENT

_____ 2" Bladder Pump _____ Bailer (Teflon)

_____ Bomb Sampler _____ Bailer (Stainless Steel)

_____ Dipper _____ Submersible Pump

_____ Well Wizard™ _____ Dedicated

Other: _____

WELL INTEGRITY: _____ LOCK: _____

REMARKS: _____

pH, E.C., Temp. Meter Calibration: Date: _____ Time: _____ Meter Serial No.: _____

E.C. 1000 _____ / _____ pH 7 _____ / _____ pH 10 _____ / _____ pH 4 _____ / _____

Temperature °F _____

SIGNATURE: _____ REVIEWED BY: _____ PAGE _____ OF _____

WATER SAMPLE FIELD DATA SHEET

FIGURE A-2

**IT - SACRAMENTO**
**GROUNDWATER SAMPLING AND ANALYSIS REQUEST FORM**

PROJECT NAME :

SCHEDULED DATE :

**SPECIAL INSTRUCTIONS / CONSIDERATIONS :**

Project Authorization: _____
EMCON Project No.: _____
OWT Project No.: _____
Task Code: _____
Originals To: _____
cc: _____

| Well Lock Number (s) |
|---|
| |
| |
| |
| |

☐ CHECK BOX TO AUTHORIZE DATA ENTRY

Site Contact: _____ Name _____ Phone #

| Well Number or Source | Casing Diameter (inches) | Casing Length (feet) | Depth to Water (feet) | ANAYSES REQUESTED |
|---|---|---|---|---|
| | | | | |

Laboratory and Lab QC Istructions:

**SAMPLING AND ANALYSIS REQUEST FORM**

**FIGURE A-3**

# APPENDIX B

# CERTIFIED ANALYTICAL REPORTS, AND CHAIN-OF-CUSTODY DOCUMENTATION

Columbia Analytical Services INC.
An Employee-Owned Company

November 24, 1999

Service Request No.: S9903560

Mr. Glen Vanderveen
IT/EMCON
2201 Broadway, Suite 101
Oakland, CA 94612

RECEIVED
NOV 29 1999
BY:

**RE:** **TO#24118.00/RAT8/6113 LIVERMORE**

Dear Mr. Vanderveen:

Enclosed are the results of the sample(s) submitted to our laboratory on November 15, 1999. All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply to the sample(s) analyzed. Columbia Analytical Services is not responsible for use of less than the complete report. Signature of this CAS Analytical Report confirms that pages 2 through 18, following, have been thoroughly reviewed and approved for release.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 2352, expiration: January 31, 2001).

If you have any questions, please call me at (408) 748-9700.

Respectfully submitted,

**Columbia Analytical Services, Inc.**

Bernadette Troncales
Project Chemist

Greg Jordan
Laboratory Director

## COLUMBIA ANALYTICAL SERVICES, Inc.

### Acronyms

| | |
|---|---|
| **A2LA** | American Association for Laboratory Accreditation |
| **ASTM** | American Society for Testing and Materials |
| **BOD** | Biochemical Oxygen Demand |
| **BTEX** | Benzene, Toluene, Ethylbenzene, Xylenes |
| **CAM** | California Assessment Metals |
| **CARB** | California Air Resources Board |
| **CAS Number** | Chemical Abstract Service registry Number |
| **CFC** | Chlorofluorocarbon |
| **CFU** | Colony-Forming Unit |
| **COD** | Chemical Oxygen Demand |
| **DEC** | Department of Environmental Conservation |
| **DEQ** | Department of Environmental Quality |
| **DHS** | Department of Health Services |
| **DLCS** | Duplicate Laboratory Control Sample |
| **DMS** | Duplicate Matrix Spike |
| **DOE** | Department of Ecology |
| **DOH** | Department of Health |
| **EPA** | U. S. Environmental Protection Agency |
| **ELAP** | Environmental Laboratory Accreditation Program |
| **GC** | Gas Chromatography |
| **GC/MS** | Gas Chromatography/Mass Spectrometry |
| **IC** | Ion Chromatography |
| **ICB** | Initial Calibration Blank sample |
| **ICP** | Inductively Coupled Plasma atomic emission spectrometry |
| **ICV** | Initial Calibration Verification sample |
| **J** | Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding. |
| **LCS** | Laboratory Control Sample |
| **LUFT** | Leaking Underground Fuel Tank |
| **M** | Modified |
| **MBAS** | Methylene Blue Active Substances |
| **MCL** | Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA. |
| **MDL** | Method Detection Limit |
| **MPN** | Most Probable Number |
| **MRL** | Method Reporting Limit |
| **MS** | Matrix Spike |
| **MTBE** | Methyl tert-Butyl Ether |
| **NA** | Not Applicable |
| **NAN** | Not Analyzed |
| **NC** | Not Calculated |
| **NCASI** | National Council of the paper industry for Air and Stream Improvement |
| **ND** | Not Detected at or above the method reporting/detection limit (MRL/MDL) |
| **NIOSH** | National Institute for Occupational Safety and Health |
| **NTU** | Nephelometric Turbidity Units |
| **ppb** | Parts Per Billion |
| **ppm** | Parts Per Million |
| **PQL** | Practical Quantitation Limit |
| **QA/QC** | Quality Assurance/Quality Control |
| **RCRA** | Resource Conservation and Recovery Act |
| **RPD** | Relative Percent Difference |
| **SIM** | Selected Ion Monitoring |
| **SM** | Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992 |
| **STLC** | Solubility Threshold Limit Concentration |
| **SW** | Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB. |
| **TCLP** | Toxicity Characteristic Leaching Procedure |
| **TDS** | Total Dissolved Solids |
| **TPH** | Total Petroleum Hydrocarbons |
| **tr** | Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding. |
| **TRPH** | Total Recoverable Petroleum Hydrocarbons |
| **TSS** | Total Suspended Solids |
| **TTLC** | Total Threshold Limit Concentration |
| **VOA** | Volatile Organic Analyte(s) |

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/11/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

### BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-1(44) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-001 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/12/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-3(38) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-002 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/19/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/19/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/19/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/19/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/19/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/19/99 | ND | |

Approved By: _____ Date: 11/24/99

IS22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/11/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-7(67) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-003 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/11/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-8(66) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-004 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/11/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

Sample Name: MW-9(67)
Lab Code: S9903560-005
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/12/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-10(49) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-006 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert* -Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/12/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-11(44) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-007 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/12/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-2(38) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-008 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/12/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-6(66) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-009 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | 0.5 | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/12/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-4(26) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-010 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | 88 | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | 10 | |

Approved By: _____ Date: 11/24/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | 11/12/99 |
| **Sample Matrix:** | Water | **Date Received:** | 11/15/99 |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | MW-5(62) | Units: | ug/L (ppb) |
| Lab Code: | S9903560-011 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 20 | NA | 11/19/99 | 18000 | |
| Benzene | EPA 5030 | 8021B | 0.5 | 20 | NA | 11/19/99 | 900 | |
| Toluene | EPA 5030 | 8021B | 0.5 | 20 | NA | 11/19/99 | 190 | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 20 | NA | 11/19/99 | 1100 | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 20 | NA | 11/19/99 | 3200 | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 20 | NA | 11/19/99 | 72 | |

Approved By: _____ Date: 11/20/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | ARCO Products Company | **Service Request:** | S9903560 |
| **Project:** | TO#24118.00/RAT8/6113 LIVERMORE | **Date Collected:** | NA |
| **Sample Matrix:** | Water | **Date Received:** | NA |

BTEX, MTBE and TPH as Gasoline

| | | | |
|---|---|---|---|
| Sample Name: | Method Blank | Units: | ug/L (ppb) |
| Lab Code: | S991118-WB2 | Basis: | NA |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | MRL | Dilution Factor | Date Extracted | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 50 | 1 | NA | 11/18/99 | ND | |
| Benzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Toluene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 1 | NA | 11/18/99 | ND | |
| Xylenes, Total | EPA 5030 | 8021B | 1 | 1 | NA | 11/18/99 | ND | |
| Methyl *tert*-Butyl Ether | EPA 5030 | 8021B | 3 | 1 | NA | 11/18/99 | ND | |

Approved By: _____ Date: 11/24/99

1S22/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

**Client:** ARCO Products Company
**Project:** TO#24118.00/RAT8/6113 LIVERMORE
**Sample Matrix:** Water

**Service Request:** S9903560
**Date Collected:** NA
**Date Received:** NA
**Date Extracted:** NA
**Date Analyzed:** NA

Surrogate Recovery Summary
BTEX, MTBE and TPH as Gasoline

Prep Method: EPA 5030
Analysis Method: 8021B CA/LUFT

Units: PERCENT
Basis: NA

| Sample Name | Lab Code | Test Notes | Percent Recovery 4-Bromofluorobenzene | Percent Recovery a,a,a-Trifluorotoluene |
|---|---|---|---|---|
| MW-1(44) | S9903560-001 | | 89 | 101 |
| MW-3(38) | S9903560-002 | | 88 | 96 |
| MW-7(67) | S9903560-003 | | 91 | 100 |
| MW-8(66) | S9903560-004 | | 95 | 100 |
| MW-9(67) | S9903560-005 | | 94 | 99 |
| MW-10(49) | S9903560-006 | | 94 | 100 |
| MW-11(44) | S9903560-007 | | 94 | 97 |
| MW-2(38) | S9903560-008 | | 89 | 91 |
| MW-6(66) | S9903560-009 | | 93 | 97 |
| MW-4(26) | S9903560-010 | | 92 | 98 |
| MW-5(62) | S9903560-011 | | 96 | 101 |
| BATCH QC | s9903560-001MS | | 91 | 117 |
| BATCH QC | s9903560-001DMS | | 91 | 111 |
| Method Blank | S991118-WB2 | | 92 | 97 |
| CAS Acceptance Limits: | | | 69-116 | 72-139 |

Approved By: _____ Date: 11/24/99

SUR2/020397p

**COLUMBIA ANALYTICAL SERVICES, INC.**

QA/QC Report

**Client:** ARCO Products Company
**Project:** TO#24118.00/RAT8/6113 LIVERMORE
**Sample Matrix:** Water

**Service Request:** S9903560
**Date Collected:** NA
**Date Received:** NA
**Date Extracted:** NA
**Date Analyzed:** 11/18/99

Matrix Spike/Duplicate Matrix Spike Summary
BTEX and TPH as Gasoline

Sample Name: BATCH QC
Lab Code: s9903560-001MS, s9903560-001DMS
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | MRL | Spike Level MS | Spike Level DMS | Sample Result | Spike Result MS | Spike Result DMS | Percent Recovery MS | Percent Recovery DMS | CAS Acceptance Limits | Relative Percent Difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | EPA 5030 | 8021B | 0.5 | 25 | 25 | ND | 27 | 27 | 108 | 108 | 75-135 | <1 |
| Toluene | EPA 5030 | 8021B | 0.5 | 25 | 25 | ND | 23 | 25 | 92 | 100 | 73-136 | 8 |
| Ethylbenzene | EPA 5030 | 8021B | 0.5 | 25 | 25 | ND | 23 | 26 | 92 | 104 | 69-142 | 12 |
| Gasoline | EPA 5030 | CA/LUFT | 50 | 250 | 250 | ND | 270 | 240 | 108 | 96 | 75-135 | 12 |

Approved By: _____ Date: 11/24/99

DMS/020597p

## COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

**Client:** ARCO Products Company
**Project:** TO#24118.00/RAT8/6113 LIVERMORE
**LCS Matrix:** Water

**Service Request:** S9903560
**Date Collected:** NA
**Date Received:** NA
**Date Extracted:** NA
**Date Analyzed:** 11/18/99

Laboratory Control Sample Summary
BTEX and TPH as Gasoline

Sample Name: Lab Control Sample
Lab Code: S991118-LCS
Test Notes:

Units: ug/L (ppb)
Basis: NA

| Analyte | Prep Method | Analysis Method | True Value | Result | Percent Recovery | CAS Percent Recovery Acceptance Limits | Result Notes |
|---|---|---|---|---|---|---|---|
| Benzene | EPA 5030 | 8021B | 25 | 25 | 100 | 75-135 | |
| Toluene | EPA 5030 | 8021B | 25 | 23 | 92 | 73-136 | |
| Ethylbenzene | EPA 5030 | 8021B | 25 | 23 | 92 | 69-142 | |
| Gasoline | EPA 5030 | CA/LUFT | 250 | 250 | 100 | 75-135 | |

Approved By: _____ Date: 11/24/99

LCS/020597p

**COLUMBIA ANALYTICAL SERVICES, INC.**

QA/QC Report

**Client:** ARCO Products Company
**Project:** TO#24118.00/RAT8/6113 LIVERMORE

**Service Request:** S9903560
**Date Analyzed:** 11/18/99

Initial Calibration Verification (ICV) Summary
BTEX, MTBE and TPH as Gasoline

Sample Name: ICV
Lab Code: ICV1
Test Notes:

Units: ug/L (ppb)
Basis: NA

ICV Source:

| Analyte | Prep Method | Analysis Method | True Value | Result | CAS Percent Recovery Acceptance Limits | Percent Recovery | Result Notes |
|---|---|---|---|---|---|---|---|
| TPH as Gasoline | EPA 5030 | CA/LUFT | 250 | 250 | 85-115 | 100 | |
| Benzene | EPA 5030 | 8021B | 25 | 25 | 85-115 | 100 | |
| Toluene | EPA 5030 | 8021B | 25 | 23 | 85-115 | 92 | |
| Ethylbenzene | EPA 5030 | 8021B | 25 | 23 | 85-115 | 92 | |
| Xylenes, Total | EPA 5030 | 8021B | 75 | 73 | 85-115 | 97 | |
| Methyl *tert* -Butyl Ether | EPA 5030 | 8021B | 25 | 23 | 85-115 | 92 | |

Approved By: _____ Date: 11/24/99

ICV/032196

**ARCO Products Company**
Division of AtlanticRichfieldCompany

**Task Order No.** 24118.00 S9903560

**Chain of Custody**

| | | | |
|---|---|---|---|
| ARCO Facility no. 6113 | City (Facility) Livermore | Project manager (Consultant) Glen VanderVeen | Laboratory name CAS |
| ARCO engineer Paul Supple | Telephone no. (ARCO) | Telephone no. (Consultant) (408) 453-7300 | Fax no. (Consultant) (408) 437-9526 |
| Consultant name EMCON | Address (Consultant) 2201 Broadway #101 Oakland, CA 94612 | | Contract number |

| Sample I.D. | Lab no. | Container no. | Matrix: Soil | Matrix: Water | Matrix: Other | Preservation: Ice | Preservation: Acid | Sampling date | Sampling time | BTEX 602/EPA 8020 | BTEX/TPH (GC/MS) EPA M602/8020/8015 | TPH Modified 8015 Gas ☐ Diesel ☐ | Oil and Grease 413.1 ☐ 413.2 ☐ | TPH EPA 418.1/SM503E | EPA 601/8010 | EPA 624/8240 | EPA 625/8270 | TCLP Metals ☐ Semi VOA ☐ VOA ☐ | CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐ | Lead Org./DHS ☐ Lead EPA 7420/7421 ☐ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 (44') | 2 | 1 | | X | | X | HCl | 11-11-99 | 1425 | | X | | | | | | | | | | | |
| MW-3 (38') | 2 | 2 | | X | | X | HCl | 11-12-99 | 0755 | | X | | | | | | | | | | | |
| MW-7 (67') | 2 | 3 | | X | | X | HCl | 11-11-99 | 1215 | | X | | | | | | | | | | | |
| MW-8 (66') | 2 | 4 | | X | | X | HCl | 11-11-99 | 1355 | | X | | | | | | | | | | | |
| MW-9 (71') | 2 | 5 | | X | | X | HCl | 11-11-99 | 1305 | | X | | | | | | | | | | | |
| MW-10 (45') | 2 | 6 | | X | | X | HCl | 11/12/99 | 0705 | | X | | | | | | | | | | | |
| MW-11 (44') | 2 | 7 | | X | | X | HCl | 11/12/99 | 0730 | | X | | | | | | | | | | | |
| ~~MW-12 (  )~~ | ~~2~~ | | | ~~X~~ | | ~~X~~ | ~~HCl~~ | | | | ~~X~~ | | | | | | | | | | | |
| MW-2 (38') | 2 | 8 | | X | | X | HCl | 11-12-99 | 0825 | | X | | | | | | | | | | | |
| MW-6 (66') | 2 | 9 | | X | | X | HCl | 11-12-99 | 0915 | | X | | | | | | | | | | | |
| MW-4 (61') | 2 | 10 | | X | | X | HCl | 11-12-99 | 1000 | | X | | | | | | | | | | | |
| MW-5 (60') | 2 | 11 | | X | | X | HCl | 11/12/99 | 1045 | | X | | | | | | | | | | | |

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: RAT 8
2-40ml HCl VOAs
#791671

Lab number

Turnaround time
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Condition of sample:

Temperature received: Due: 12/1/99 R11/D3-D

| | | | |
|---|---|---|---|
| Relinquished by sampler | Date 11/15/99 | Time | Received by Brian Fuller 11/15/99 9:30 |
| Relinquished by | Date | Time | Received by |
| Relinquished by | Date | Time | Received by laboratory / Date / Time |

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

ARC-3292 (2-91)

# APPENDIX C

# FIELD DATA SHEETS

# FIELD REPORT
## DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 792241 STATION ADDRESS : 785 East Stanley Blvd., Livermore DATE : 11-Nov-99

ARCO STATION # : 6113 FIELD TECHNICIAN : Manuel Gallegos DAY : Thursday

| DTW Order | WELL ID | Well Box Seal Condition | Well Lid Secure | Gasket Present | Lock Number | Type Of Well Cap | FIRST DEPTH TO WATER (feet) | SECOND DEPTH TO WATER (feet) | DEPTH TO FLOATING PRODUCT (feet) | FLOATING PRODUCT THICKNESS (feet) | WELL TOTAL DEPTH (feet) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MW-1 | OK | OK | OK | ARCO | LWC | 18.63 | 18.63 | ND | | 44.3 | |
| 2 | MW-3 | OK | OK | OK | ARCO | LWC | 18.58 | 18.58 | | | 38.7 | |
| 3 | MW-7 | OK | OK | OK | ARCO | LWC | 18.02 | 18.02 | | | 67.0 | |
| 4 | MW-8 | OK | OK | OK | ARCO | LWC | 16.67 | 16.67 | | | 66.1 | |
| 5 | MW-9 | OK | OK | OK | ARCO | LWC | 17.02 | 17.02 | | | 67.3 | |
| 6 | MW-10 | OK | OK | OK | ARCO | LWC | 19.35 | 19.35 | | | 49.3 | |
| 7 | MW-11 | OK | OK | OK | ARCO | LWC | 18.62 | 18.62 | | | 44.1 | |
| 8 | MW-12 | FL | | | ARCO | LWC | | | | | | unable to Locate. |
| 9 | MW-2 (or) | OK | OK | OK | ARCO | LWC | 18.75 | 18.75 | | | 38.3 | |
| 10 | MW-6 | OK | OK | OK | ARCO | LWC | 16.12 | 16.12 | | | 66.0 | |
| 11 | MW-4 | OK | OK | OK | ARCO | LWC | 19.25 | 19.25 | | | 26.2 | |
| 12 | MW-5 | OK | OK | OK | None | Slip | 18.80 | 18.80 | | | 67.2 | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

SURVEY POINTS ARE TOP OF WELL CASINGS

RECEIVED
JAN 12 2000
BY:

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-1 (44')

PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113

SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 X | 3 ____ | 4 ____ | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 4.19

DEPTH OF WELL (feet) : 44.3 | CALCULATED PURGE (gal.) : 12.57

DEPTH OF WATER (feet) : 18.63 | ACTUAL PURGE VOL. (gal.) : 13.0

DATE PURGED : 11/11/99 | END PURGE : 1416

DATE SAMPLED : 11/11/99 | SAMPLING TIME : 1425

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 1412 | 4.5 | 7.04 | 969 | 68.3 | Clear | Light |
| 1414 | 9.0 | 7.01 | 565 | 67.5 | " | Clear |
| 1416 | 13.0 | 7.06 | 566 | 67.2 | " | " |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 1.03 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Centrifugal Pump | ____ Bailer (PVC)

X Submersible Pump | ____ Bailer (Stainless Steel)

____ Well WizardÔ | ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Bomb Sampler | ____ Bailer (Stainless Steel)

____ Dipper | ____ Submersible Pump

____ Well WizardÔ | ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: All Samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/11/99 | Time: ____ | Meter Serial No.: 87m

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-2 (38')
PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113
SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____
CASING DIAMETER (inches): 2 X | 3 ____ | 4 ____ | 4.5 ____ | 6 ____ | Other ____

| | | | |
|---|---|---|---|
| CASING ELEVATION (feet/MSL) : | N/A | VOLUME IN CASING (gal.) : | 3.19 |
| DEPTH OF WELL (feet) : | 38.3 | CALCULATED PURGE (gal.) : | 9.57 |
| DEPTH OF WATER (feet) : | 18.75 | ACTUAL PURGE VOL. (gal.) : | 10.0 |

DATE PURGED : 11/12/99 | END PURGE : 0818
DATE SAMPLED : 11/12/99 | SAMPLING TIME : 0825

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 0814 | 3.5 | 7.06 | 640 | 61.0 | cloudy | light |
| 0816 | 7.0 | 6.96 | 632 | 61.8 | clear | clear |
| 0818 | 10.0 | 6.94 | 634 | 61.9 | " | " |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 0.82 | ODOR: None | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)
____ Centrifugal Pump | ____ Bailer (PVC)
X Submersible Pump | ____ Bailer (Stainless Steel)
____ Well WizardÔ | ____ Dedicated
Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)
____ Bomb Sampler | ____ Bailer (Stainless Steel)
____ Dipper | ____ Submersible Pump
____ Well WizardÔ | ____ Dedicated
Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: All Samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/12/99 | Time: ____ | Meter Serial No.: 87m

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: MSA | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-3(38')

PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113

SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 X | 3 ____ | 4 ____ | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 3.28

DEPTH OF WELL (feet) : 38.7 | CALCULATED PURGE (gal.) : 9.84

DEPTH OF WATER (feet) : 18.60 | ACTUAL PURGE VOL. (gal.) : 10.0

DATE PURGED : 11/12/99 | END PURGE : 0748

DATE SAMPLED : 11/12/99 | SAMPLING TIME : 0755

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 0744 | 3.5 | 7.12 | 679 | 62.1 | Cloudy | Mod |
| 0746 | 7.0 | 7.05 | 656 | 63.1 | Clear | Clear |
| 0748 | 10.0 | 7.04 | 659 | 63.1 | " | " |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 0.79 | ODOR: Slight | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Centrifugal Pump | ____ Bailer (PVC)

X Submersible Pump | ____ Bailer (Stainless Steel)

____ Well WizardÔ | ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Bomb Sampler | ____ Bailer (Stainless Steel)

____ Dipper | ____ Submersible Pump

____ Well WizardÔ | ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: All Samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/12/99 | Time: ____ | Meter Serial No.: 8700

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: [signature] | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO: 792241 | SAMPLE ID: MW-4 (26')
PURGED BY: Manuel Gallegos | CLIENT NAME: ARCO #6113
SAMPLED BY: Manuel Gallegos | LOCATION: Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 ____ | 3 ____ | 4 X | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL): N/A
DEPTH OF WELL (feet): 26.2
DEPTH OF WATER (feet): 19.25
VOLUME IN CASING (gal.): 4.54
CALCULATED PURGE (gal.): 13.62
ACTUAL PURGE VOL. (gal.): 14.0

DATE PURGED: 11/12/99 | END PURGE: 0949
DATE SAMPLED: 11/12/99 | SAMPLING TIME: 1000

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 0943 | 4.5 | 6.93 | 654 | 65.2 | Clear | Clear |
| 0946 | 9.0 | 6.73 | 647 | 66.3 | " | " |
| 0949 | 14.0 | 6.75 | 638 | 66.4 | " | " |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 0.77 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): N/A

PURGING EQUIPMENT

____ 2" Bladder Pump
____ Centrifugal Pump
X Submersible Pump
____ Well WizardÔ
____ Bailer (Teflon)
____ Bailer (PVC)
____ Bailer (Stainless Steel)
____ Dedicated
Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump
____ Bomb Sampler
____ Dipper
____ Well WizardÔ
____ Bailer (Teflon)
____ Bailer (Stainless Steel)
____ Submersible Pump
____ Dedicated
Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: All Samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/12/99 | Time: ____ | Meter Serial No.: 870

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: Manuel Gallegos | REVIEWED BY: MH | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-5 (62')

PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113

SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 ____ | 3 ____ | 4 X | 4.5 ____ | 6 ____ | Other ____

| | | | |
|---|---|---|---|
| CASING ELEVATION (feet/MSL) : | N/A | VOLUME IN CASING (gal.) : | 28.35 |
| DEPTH OF WELL (feet) : | 62.2 | CALCULATED PURGE (gal.) : | 85.06 |
| DEPTH OF WATER (feet) : | 18.80 | ACTUAL PURGE VOL. (gal.) : | 85.5 |

DATE PURGED : 11/12/99 | END PURGE : 1039

DATE SAMPLED : 11/12/99 | SAMPLING TIME : 1045

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 1017 | 28.5 | 6.92 | 726 | 66.0 | clear | clear |
| 1028 | 57.0 | 6.91 | 732 | 66.0 | " | " |
| 1039 | 85.5 | 6.93 | 738 | 65.7 | " | " |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 0.86 | ODOR: Strong | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Centrifugal Pump | ____ Bailer (PVC)

X Submersible Pump | ____ Bailer (Stainless Steel)

____ Well WizardÔ | ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Bomb Sampler | ____ Bailer (Stainless Steel)

____ Dipper | ____ Submersible Pump

____ Well WizardÔ | ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: Cont.

REMARKS: All Samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/12/99 | Time: ____ | Meter Serial No.: 87m

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY M.S. | PAGE ____ OF ____

4

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO: 792241 | SAMPLE ID: MW-6 (66')
PURGED BY: Manuel Gallegos | CLIENT NAME: ARCO #6113
SAMPLED BY: Manuel Gallegos | LOCATION: Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____
CASING DIAMETER (inches): 2 ____ 3 ____ 4 X 4.5 ____ 6 ____ Other ____

CASING ELEVATION (feet/MSL): N/A
DEPTH OF WELL (feet): 66.0
DEPTH OF WATER (feet): 16.12
VOLUME IN CASING (gal.): 32.58
CALCULATED PURGE (gal.): 97.76
ACTUAL PURGE VOL. (gal.): 98.0

DATE PURGED: 11/12/99 | END PURGE: 0907
DATE SAMPLED: 11/12/99 | SAMPLING TIME: 0915

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 0844 | 32.5 | 6.95 | 748 | 62.0 | clear | clear |
| 0855 | 65.0 | 6.90 | 745 | 62.7 | ↓ | ↓ |
| 0907 | 98.0 | 6.92 | 750 | 63.0 | ↓ | ↓ |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 0.92 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1): N/A

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)
____ Centrifugal Pump ____ Bailer (PVC)
X Submersible Pump ____ Bailer (Stainless Steel)
____ Well WizardÔ ____ Dedicated
Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)
____ Bomb Sampler ____ Bailer (Stainless Steel)
____ Dipper ____ Submersible Pump
____ Well WizardÔ ____ Dedicated
Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/12/99 | Time: ____ | Meter Serial No.: 8700
E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____
Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: M.S.J. | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-7 (67')
PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113
SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 ____ | 3 ____ | 4 X | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 32.00
DEPTH OF WELL (feet) : 67.0 | CALCULATED PURGE (gal.) : 96.00
DEPTH OF WATER (feet) : 18.02 | ACTUAL PURGE VOL. (gal.) : 96.0

DATE PURGED : 11/1/99 | END PURGE : 1208
DATE SAMPLED : 11/1/99 | SAMPLING TIME : 1215

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 1140 | 32.0 | 6.72 | 660 | 69.9 | Clear | Clear |
| 1151 | 64.0 | 6.81 | 662 | 68.5 | " | " |
| 1202 | 96.0 | 6.86 | 671 | 69.1 | " | " |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 1.03 | ODOR: Slight | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)
____ Centrifugal Pump | ____ Bailer (PVC)
✓ Submersible Pump | ____ Bailer (Stainless Steel)
____ Well WizardÔ | ____ Dedicated
Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)
____ Bomb Sampler | ____ Bailer (Stainless Steel)
____ Dipper | ____ Submersible Pump
____ Well WizardÔ | ____ Dedicated
Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: Allo

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/1/99 | Time: ____ | Meter Serial No.: 87M
E.C. 1000 1007 / 1000 | pH 7 706 / 700 | pH 10 996 / 1000 | pH 4 403 / 400
Temperature °F 70.6

SIGNATURE: [signature] | REVIEWED BY: MS.A | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-8 (GW)

PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113

SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 ____ | 3 ____ | 4 X | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 32.29

DEPTH OF WELL (feet) : 66.1 | CALCULATED PURGE (gal.) : 96.88

DEPTH OF WATER (feet) : 16.67 | ACTUAL PURGE VOL. (gal.) : 97.0

DATE PURGED : 11/11/99 | END PURGE : 1346

DATE SAMPLED : 11/11/99 | SAMPLING TIME : 1355

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 1323 | 32.5 | 6.84 | 642 | 68.3 | Clear | Clear |
| 1334 | 65.0 | 6.79 | 643 | 68.1 | " | " |
| 1346 | 97.0 | 6.79 | 648 | 67.5 | " | " |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 1.01 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Centrifugal Pump | ____ Bailer (PVC)

X Submersible Pump | ____ Bailer (Stainless Steel)

____ Well WizardÔ | ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Bomb Sampler | ____ Bailer (Stainless Steel)

____ Dipper | ____ Submersible Pump

____ Well WizardÔ | ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: All Samples Taken

pH, E.C., Temp. Meter Calibration: Date: 11/11/99 | Time: ____ | Meter Serial No.: 870

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: mel | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-9 (67')

PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113

SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 ____ | 3 ____ | 4 X | 4.5 ____ | 6 ____ | Other ____

| | | | |
|---|---|---|---|
| CASING ELEVATION (feet/MSL) : | N/A | VOLUME IN CASING (gal.) : | 32.84 |
| DEPTH OF WELL (feet) : | 67.3 | CALCULATED PURGE (gal.) : | 98.54 |
| DEPTH OF WATER (feet) : | 17.02 | ACTUAL PURGE VOL. (gal.) : | 99.0 |

DATE PURGED : 11/11/99 | END PURGE : 1256

DATE SAMPLED : 11/11/99 | SAMPLING TIME : 1305

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 1232 | 33.0 | 6.87 | 639 | 70.2 | Clear | Clear |
| 1244 | 66.0 | 6.78 | 643 | 69.1 | | |
| 1256 | 99.0 | 6.80 | 649 | 68.3 | ↓ | ↓ |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 0.56 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Centrifugal Pump | ____ Bailer (PVC)

X Submersible Pump | ____ Bailer (Stainless Steel)

____ Well WizardÔ | ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Bomb Sampler | ____ Bailer (Stainless Steel)

____ Dipper | ____ Submersible Pump

____ Well WizardÔ | ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: All Samples Taken

pH, E.C., Temp. Meter Calibration: Date: 11/11/99 | Time: ____ | Meter Serial No.: 877M

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: MSJ | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-10 (49')

PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113

SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 ____ | 3 ____ | 4 X | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 19.56

DEPTH OF WELL (feet) : 49.3 | CALCULATED PURGE (gal.) : 58.70

DEPTH OF WATER (feet) : 19.35 | ACTUAL PURGE VOL. (gal.) : 59.0

DATE PURGED : 11/2/99 | END PURGE : 0655

DATE SAMPLED : 11/2/99 | SAMPLING TIME : 0705

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 0641 | 19.5 | 6.53 | 540 | 63.2 | cloudy | mod |
| 0648 | 39.0 | 6.79 | 545 | 63.0 | clear | light |
| 0655 | 59.0 | 6.84 | 551 | 62.8 | " | " |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= 0.68 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Centrifugal Pump | ____ Bailer (PVC)

X Submersible Pump | ____ Bailer (Stainless Steel)

____ Well WizardÔ | ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump | ____ Bailer (Teflon)

____ Bomb Sampler | ____ Bailer (Stainless Steel)

____ Dipper | ____ Submersible Pump

____ Well WizardÔ | ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: all Samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/12/99 | Time: 0638 | Meter Serial No.: 87m

E.C. 1000 1047/1000 | pH 7 703/700 | pH 10 1000/1000 | pH 4 400/400

Temperature °F 62.8

SIGNATURE: [signature] | REVIEWED BY: MK | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-11 (4/4')

PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113

SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 X | 3 ____ | 4 ____ | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : 4.14

DEPTH OF WELL (feet) : 44.1 | CALCULATED PURGE (gal.) : 12.48

DEPTH OF WATER (feet) : 18.62 | ACTUAL PURGE VOL. (gal.) : 4.5

DATE PURGED : 11/12/99 | END PURGE : 0722

DATE SAMPLED : 11/12/99 | SAMPLING TIME : 0730

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| 0722 | 4.5 | 7.05 | 778 | 61.7 | Brn | Heavy |
| | ~~8.5~~ | | | | | |
| | ~~12.5~~ well Dry @ + 4.5 gallons. | | | | | |
| 0730 | Recharge | 6.95 | 812 | 62.6 | " | " |
| | | | | | | |

OTHER: Dissolved Oxygen= 1.01 | ODOR: none | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Centrifugal Pump ____ Bailer (PVC)

X Submersible Pump ____ Bailer (Stainless Steel)

____ Well WizardÔ ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Bomb Sampler ____ Bailer (Stainless Steel)

____ Dipper ____ Submersible Pump

____ Well WizardÔ ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: OK | LOCK: ARCO

REMARKS: all samples taken

pH, E.C., Temp. Meter Calibration: Date: 11/12/99 | Time: ____ | Meter Serial No.: 8700

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: Manuel Gallegos | REVIEWED BY: MA | PAGE ____ OF ____

# WATER SAMPLE FIELD DATA SHEET

Rev. 1/97

EMCON

PROJECT NO : 792241 | SAMPLE ID : MW-12

PURGED BY : Manuel Gallegos | CLIENT NAME : ARCO #6113

SAMPLED BY : Manuel Gallegos | LOCATION : Livermore, California

TYPE: Groundwater X | Surface Water ____ | Leachate ____ | Other ____

CASING DIAMETER (inches): 2 ____ | 3 ____ | 4 ____ | 4.5 ____ | 6 ____ | Other ____

CASING ELEVATION (feet/MSL) : N/A | VOLUME IN CASING (gal.) : N/R

DEPTH OF WELL (feet) : ____ | CALCULATED PURGE (gal.) : ____

DEPTH OF WATER (feet) : ____ | ACTUAL PURGE VOL. (gal.) : ____

DATE PURGED : 11/7/99 | END PURGE : ____

DATE SAMPLED : 11/7/99 | SAMPLING TIME : ____

| TIME (2400 HR) | VOLUME (gal.) | pH (units) | E.C. (µmhos/cm@25°c) | TEMPERATURE (°F) | COLOR (visual) | TURBIDITY (visual) |
|---|---|---|---|---|---|---|
| x10 | samples | taken | unable to | locate | well | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

OTHER: Dissolved Oxygen= | ODOR: ____ | N/A (COBALT 0-100) | N/A (NTU 0-200)

FIELD QC SAMPLES COLLECTED AT THIS WELL ( i.e. FB-1, XDUP-1) : N/A

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Centrifugal Pump ____ Bailer (PVC)

____ Submersible Pump ____ Bailer (Stainless Steel)

____ Well WizardÔ ____ Dedicated

Other: ____

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon)

____ Bomb Sampler ____ Bailer (Stainless Steel)

____ Dipper ____ Submersible Pump

____ Well WizardÔ ____ Dedicated

Other: Disposable Teflon Bailer

WELL INTEGRITY: N/A | LOCK: ____

REMARKS: N/A.

pH, E.C., Temp. Meter Calibration: Date: 11/ | Time: ____ | Meter Serial No.: 87m.

E.C. 1000 ____ / ____ | pH 7 ____ / ____ | pH 10 ____ / ____ | pH 4 ____ / ____

Temperature °F ____

SIGNATURE: [signature] | REVIEWED BY: Mad. | PAGE ____ OF ____

EMCON Associates - Field Services | Historical Monitoring Well Data

1921 Ringwood Avenue | 1999 | ARCO 6113

San Jose, California | #792241

| | | | | | | Gallons |
|---|---|---|---|---|---|---|
| | | | | | | **First** 0.00 |
| | | | | | | **Second** 413.00 |
| Well ID | Quarter | Date | Purge Volume (gallons) | Did well dry | Well Contained Product | **Third** 0.00 |
| | | | | | | **Fourth** 376.50 |
| **MW-1** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 0.00 | NA | NO | |
| | Third | NA | 0.00 | NA | NR/O | |
| | Fourth | 11/11/99 | 13.00 | NO | | |
| **MW-2** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 0.00 | NA | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 10.00 | NO | | |
| **MW-3** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 0.00 | NA | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 10.00 | NO | | |
| **MW-4** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 18.00 | NO | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 14.00 | NO | | |
| **MW-5** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 88.50 | NO | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 85.5 | NO | | |
| **MW-6** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 99.00 | NO | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 98.00 | NO | | |
| **MW-7** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 100.50 | NO | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 96.00 | NO | | |
| **MW-8** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 0.00 | NA | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 97.00 | NO | | |
| **MW-9** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 102.00 | NO | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 99.00 | NO | | |
| **MW-10** | First | NA | 0.00 | NA | NR | |
| | Second | 06/04/99 | 0.00 | NO | NO | |
| | Third | NA | 0.00 | NA | NR | |
| | Fourth | 11/11/99 | 59.00 | NO | | |

EMCON Associates - Field Services

1921 Ringwood Avenue

San Jose, California

# 1999

Historical Monitoring Well Data

ARCO 6113

#792241

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | **Gallons** |
| | | | | | | **First** | **0.00** |
| | | | | | | **Second** | **413.00** |
| Well ID | Quarter | Date | Purge Volume (gallons) | Did well dry | Well Contained Product | **Third** | **0.00** |
| | | | | | | **Fourth** | **376.50** |
| **MW-11** | First | NA | 0.00 | NA | NR | | |
| | Second | 06/04/99 | 5.00 | YES | NO | | |
| | Third | NA | 0.00 | NA | NR | | |
| | Fourth | 11/11/99 | 4.5 | Yes | N/O | | |
| **MW-12** | First | NA | 0.00 | NA | NR | Steam water (gal) | |
| | Second | 06/04/99 | 0.00 | NA | NO | | |
| | Third | NA | 0.00 | NA | NR | | |
| | Fourth | 11/11/99 | 0.83 | N/P | N/R | | |

**ARCO Products Company**
Division of AtlanticRichfieldCompany

**Task Order No.** 74119.00

**Chain of Custody**

| | | | |
|---|---|---|---|
| ARCO Facility no. 6113 | City (Facility) Livermore | Project manager (Consultant) Glen VanderVeen | Laboratory name CAS |
| ARCO engineer Paul Supple | Telephone no. (ARCO) | Telephone no. (Consultant) (408) 453-7300 | Fax no. (Consultant) (408) 437-9526 |
| Consultant name EMCON | Address (Consultant) 2201 Broadway #101 Oakland, CA 94612 | | Contract number |

| Sample I.D. | Lab no. | Container no. | Matrix: Soil | Matrix: Water | Matrix: Other | Preservation: Ice | Preservation: Acid | Sampling date | Sampling time | BTEX 602/EPA 8020 | BTEX/TPH (GC/MS) EPA M602/8020/8015 | TPH Modified 8015 Gas ☐ Diesel ☐ | Oil and Grease 413.1 ☐ 413.2 ☐ | TPH EPA 418.1/SM503E | EPA 601/8010 | EPA 624/8240 | EPA 625/8270 | TCLP Metals ☐ Semi VOA ☐ VOA ☐ | CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐ | Lead Org./DHS ☐ Lead EPA 7420/7421 ☐ | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-1 (44') | | 2 | | X | | X | HCL | 11-12-99 | 1425 | | X | | | | | | | | | | | |
| MW-3 (38') | | 2 | | X | | X | HCL | 11-12-99 | 0755 | | X | | | | | | | | | | | |
| MW-7 (67') | | 2 | | X | | X | HCL | 11-11-99 | 1215 | | X | | | | | | | | | | | |
| MW-8 (66') | | 2 | | X | | X | HCL | 11-11-99 | 1355 | | X | | | | | | | | | | | |
| MW-9 (67') | | 2 | | X | | X | HCL | 11-11-99 | 1305 | | X | | | | | | | | | | | |
| MW-10 (49') | | 2 | | X | | X | HCL | 11/12/99 | 0705 | | X | | | | | | | | | | | |
| MW-11 (44') | | 2 | | X | | X | HCL | 11/12/99 | 0730 | | X | | | | | | | | | | | |
| ~~MW-12 ( )~~ | | ~~2~~ | | ~~X~~ | | ~~X~~ | ~~HCL~~ | | | | ~~X~~ | | | | | | | | | | | |
| MW-2 (38') | | 2 | | X | | X | HCL | 11-12-99 | 0825 | | X | | | | | | | | | | | |
| MW-6 (46') | | 2 | | X | | X | HCL | 11-12-99 | 0915 | | X | | | | | | | | | | | |
| MW-4 (36') | | 2 | | X | | X | HCL | 11-12-99 | 1000 | | X | | | | | | | | | | | |
| MW-5 (60') | | 2 | | X | | X | HCL | 11/12/99 | 1015 | | X | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |

**Special detection Limit/reporting:** Lowest Possible

**Special QA/QC:** As Normal

**Remarks:** RAT 8
2 - 40ml HCL VOAs
#791671

**Method of shipment:** Sampler will deliver

**Lab number:**

**Turnaround time**
- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

| | | | |
|---|---|---|---|
| Condition of sample: | | Temperature received: | |
| Relinquished by sampler | Date 11/15/99 Time | Received by | 11/15/99 9:30 |
| Relinquished by | Date Time | Received by | |
| Relinquished by | Date Time | Received by laboratory | Date Time |

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APC-3292 (2-91)